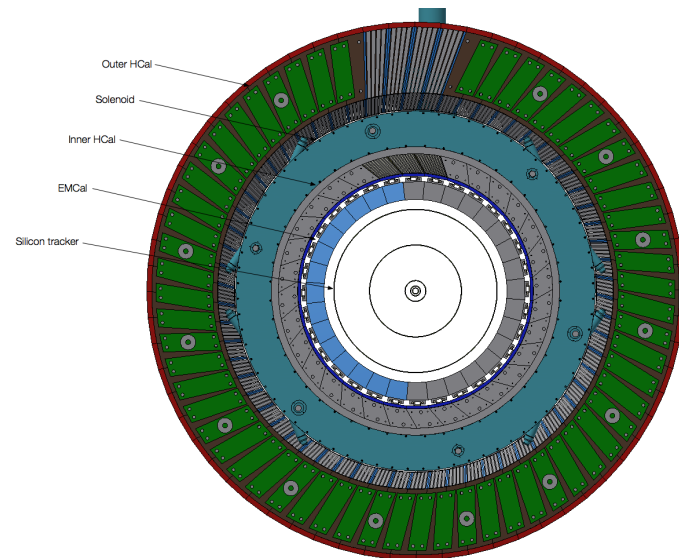




My Progress and Thoughts on Jet Simulations



Megan Connors
GSU/RBRC
HCAL Fest III
December 15, 2015



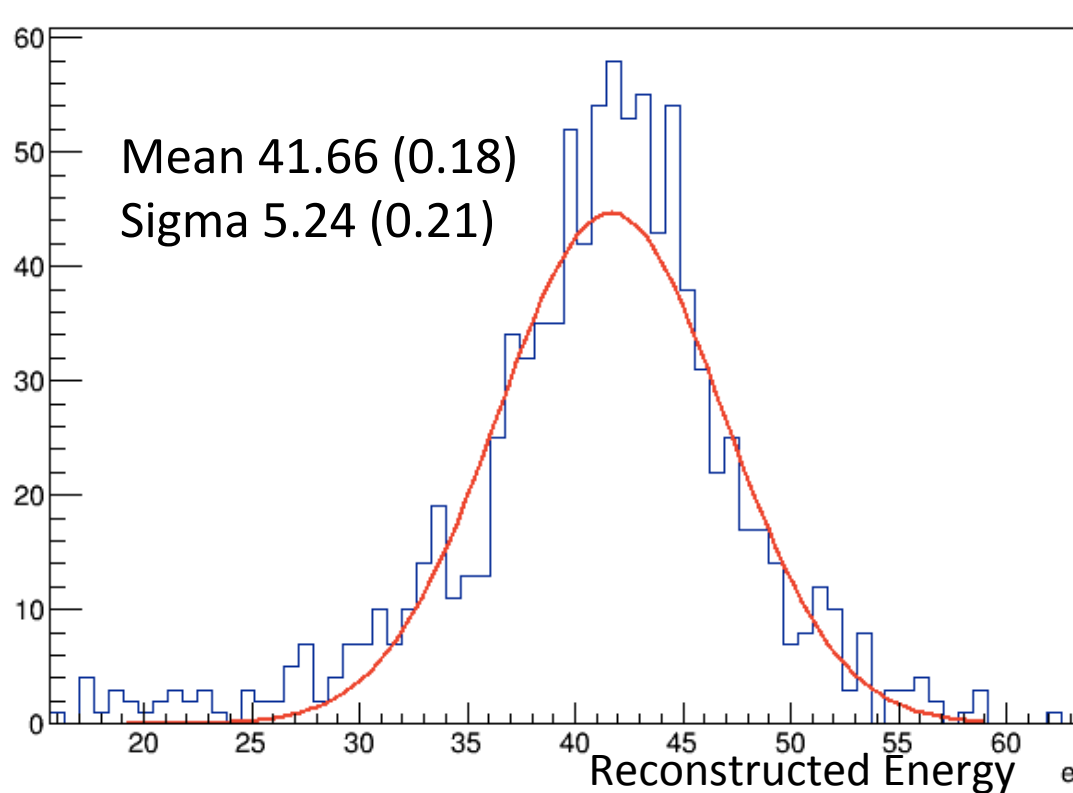
What I've managed to do

- Run Fun4All_G4_sPHENIX.C
- Set true: do_jet_reco & do_jet_eval
- Anti-kt $R=0.3$ jets according to G4_Jets.C
- Reco and Truth ntuples in g4jet_eval.root
- Plot: Response Matrix, Jet Energy Resolution (JER) & Jet Energy Scale (JES)



Step 1: JES & JER

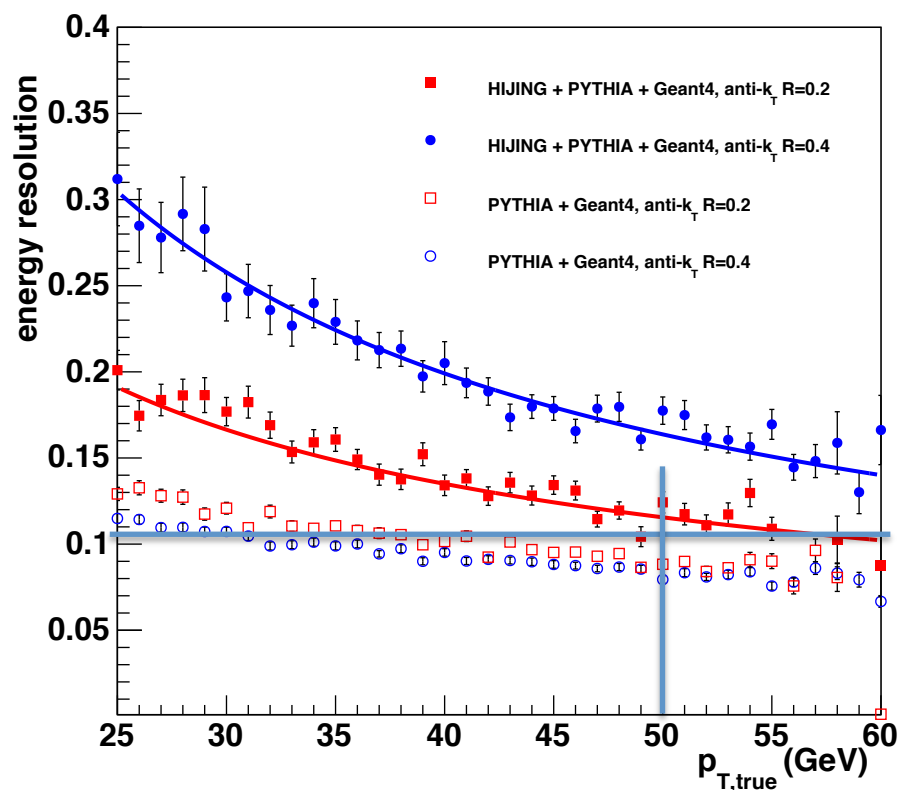
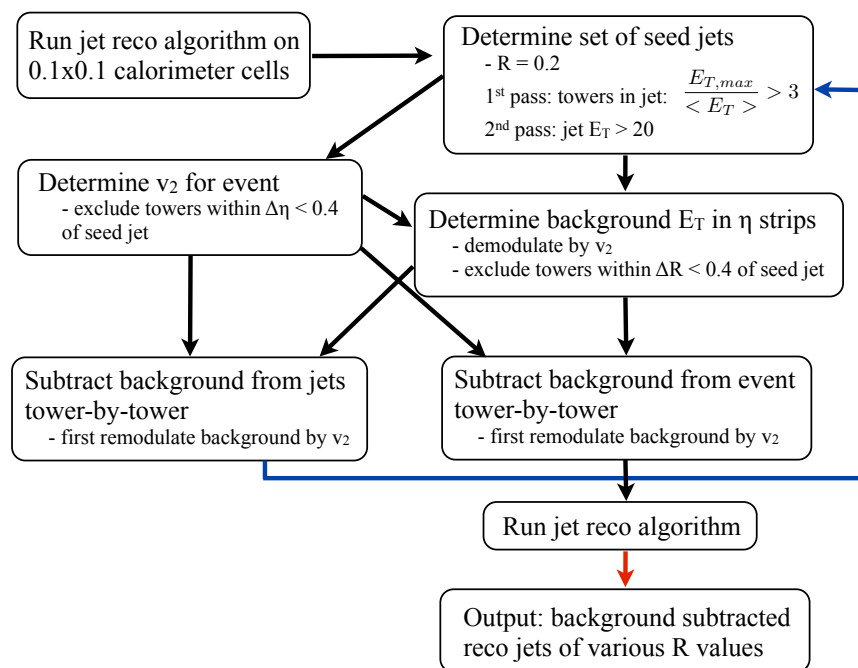
- 50 GeV pi- 1k events
- JER = 10.5%
Jet energy shift from truth = 16.7%



Previous Particle Flow Results

- My results show reasonable agreement
- Current status of particle flow method?
 - Appears to be functioning in updated code but should be tested

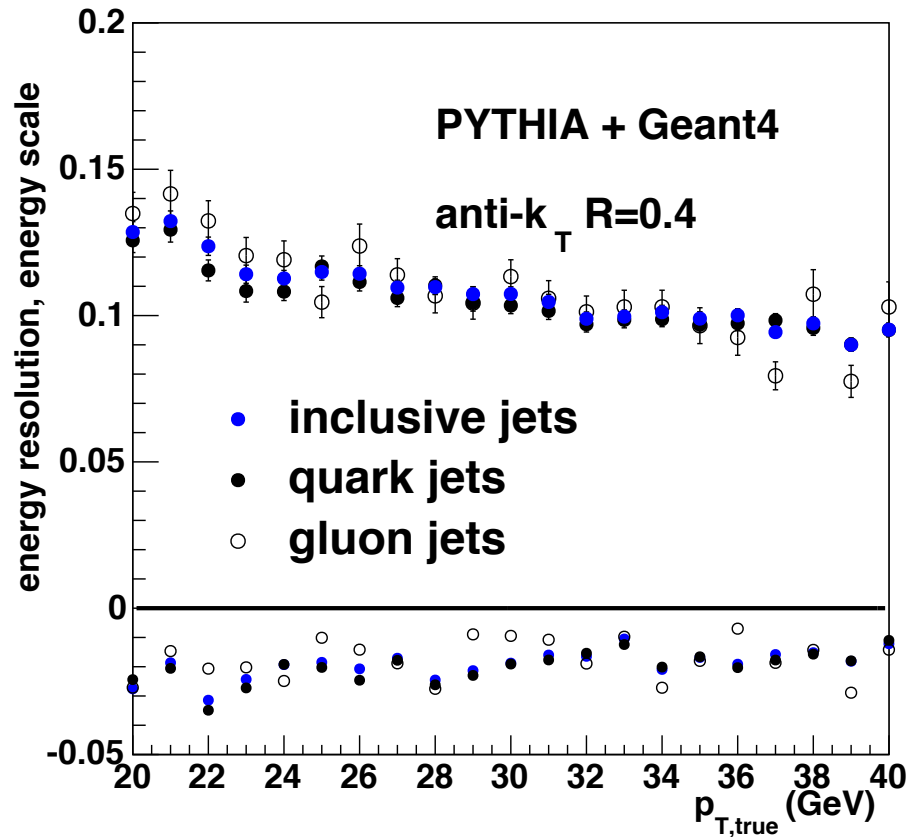
PYTHIA & HIJING in Geant4



Hanks et al PRC 86 (2012) 024908

Changes to Response

- Gluon vs quark response
- Study should be repeated with newest framework
- Hcal Tilt angles?
- Any other detector tunes?



Shown by Anne Sickles at Collab. Meeting

Jet Simulations Requirements

Tracking performance criteria

We have recently decided to adopt a set of criteria for tracking performance that can be applied to all combinations of our 4 tracking detector options - **in progress**

Physics Channel	Physics requirements	Momentum resolution	DCA resolution	eID h rejection	Single track off.	Fake track rate
$\Upsilon \rightarrow ee$	$\Delta M = 100 \text{ MeV}$ $A_E = 50\%$ of geom. acceptance	$\Delta p_T < 1.2\%$ (1-8 GeV/c)	N/A	> 90	90% ($> 2 \text{ GeV/c}$) ?	x% (before CEMC) y% (after CEMC)
$D^*(z)/D(z)$	$\sigma^h/\sigma^{\text{jet}} = x\%$ $z = 0-0.8$	$\Delta p_T < 4\%$ (1-40 GeV/c)	N/A	N/A ?	x% high p_T y% low p_T	x% within jet y% overall
b-jet ID via track counting	35% purity at 45% efficiency	?	$< 70 \mu\text{m}$	N/A	x% (set by 35% @ 45% goal)	y% (set by 35% @ 45% goal)
b-jet ID via secondary vertex	35% purity at 45% efficiency	?	$< 70 \mu\text{m}/(2-3?)$	N/A	90% ($> 2 \text{ GeV/c}$) ?	y% overall
$\gamma+h$ jet + h	h p_T below jet reco threshold	?	N/A	N/A	90% ($> 2 \text{ GeV/c}$) ?	y% overall p_T dependent
Particle flow jets	?	?	N/A	N/A	90% ($> 2 \text{ GeV/c}$) ?	y% overall p_T dependent

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- List shown by Tony at Collaboration Meeting
- Hcal/Emcal equivalent?
- Calo jets

<https://indico.bnl.gov/getFile.py/access?contribId=20&sessionId=7&resId=0&materialId=slides&confId=1376>



Discussion